AMERICAN

STATISTICAL ASSOCIATION.

NEW SERIES, No. 47. SEPTEMBER, 1899.

NOTES ON MAP MAKING AND GRAPHIC REPRESENTATION.

By W. Z. Ripley.

The necessity of a cheap and ready process of systematic map making for purposes of photo-engraving reproduction having been emphasized by recent experience in the preparation of a volume upon the *Races of Europe*, an attempt has been made to invent a number of labor-saving devices by which the old and slow methods of hand work might be obviated. The practicability of these has been demonstrated not only for experts but for educational purposes in the hands of students as well. Practice in graphic representation after methods which are so simple in principle as not to entirely absorb the attention of the student in mere technique, has been found to awaken interest, to vivify dry statistical details, and to stimulate analytical thought; while at the same time developing deftness of hand and accuracy of treatment. No excuse need be offered for a statement of the most simple details in these methods, since experience has shown that the simplest details are oftentimes the most difficult to evolve and to apply.

Before proceeding to the description of various technical processes it will repay us for a moment to consider a few

questions of general principle applicable to all methods of graphic representation. The first of these is the difficulty and danger incident to the use of color schemes. It is a cardinal principle in graphic representation that the visual impression should correspond directly to the facts as related to one another. Any scheme of color, therefore, which is not entirely logical, in a visual sense, is worse than misleading when applied to phenomena which are to be represented in a graduated series. A map in which green, red, yellow, and blue are indiscriminately used to represent different grades of intensity of suicide, for example, is fully as difficult to interpret as the statistical tables which it is intended to elucidate. The only opportunity for representation by means of *unrelated* colors is offered in the case of such phenomena, for example, as the distribution of different nationalities or religions within a country where no relationship in point of fact between the several elements exists. Where applied by Miss Addams in the Hull House Papers to show a hodge-podge of nationalities in the slums of Chicago the proceeding is perfectly scientific. But the occasions appropriate for such use are very seldom. And when unrelated colors are used by Miss Addams again to illustrate a graduated phenomenon, such as the average earnings of families ranging in a scale from $5 to $20 a week, the labor of interpreting the map is immeasurably increased beyond proportion. The evils of the employment of different colors appear perhaps more frequently in home-made wall maps than in the published charts and diagrams of professional statisticians, but the neglect of this cardinal principle is common enough to require mention, at all events, in this place.

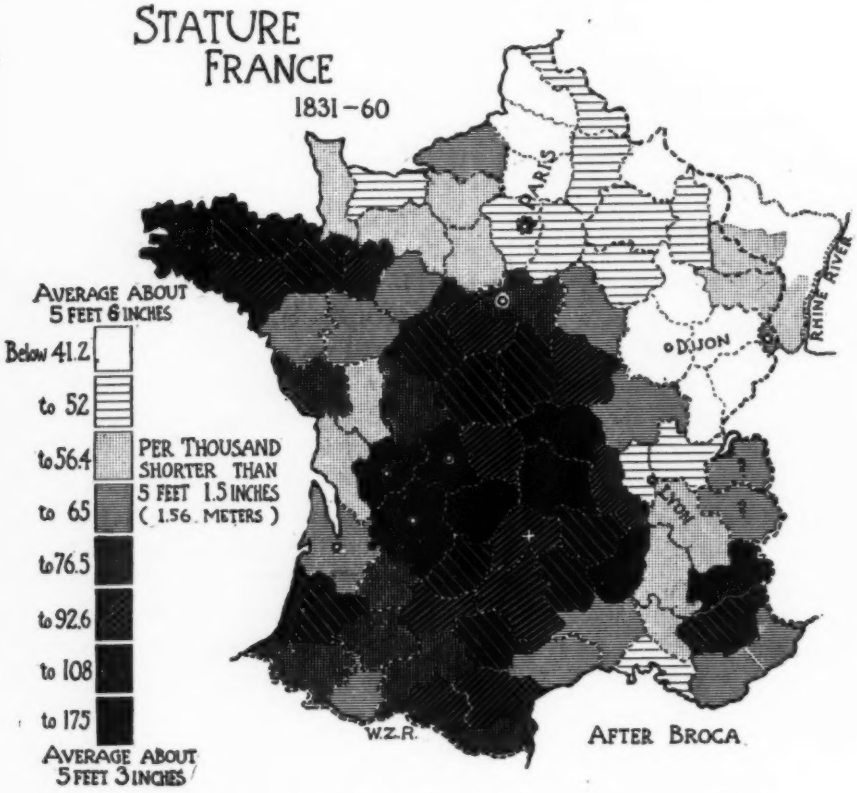
If colors are to be used at all they should either be confined to different intensities of the same color, or else, if the number of shades be too great, two colors, red and blue, for example, may be employed, the deepest tints of each standing at the extremes of the series, and each shading down to an almost white color where the two join at the

medial line. As an example of this mode of representation, see Turquan's map of the density of population in France, in the *Bulletin de l'Institut International de Statistique.*

A second principle in graphic representation is involved in the mere choice of the shading. The seriousness of the possible statistical error involved is manifested by comparison of the two maps of France on following pages. These are constructed from precisely the same data. As will at once be perceived, the graphic effect is entirely different in the two cases. The same shades are actually used, moreover; the only difference is found in the mode of grouping the various administrative divisions statistically. On both of these maps an attempt is made to represent the variations of a phenomenon — in this case it happens to be stature, but it might as well be suicide or any other demographic peculiarity — between the limits of 24 and 175 per 1000, respectively.

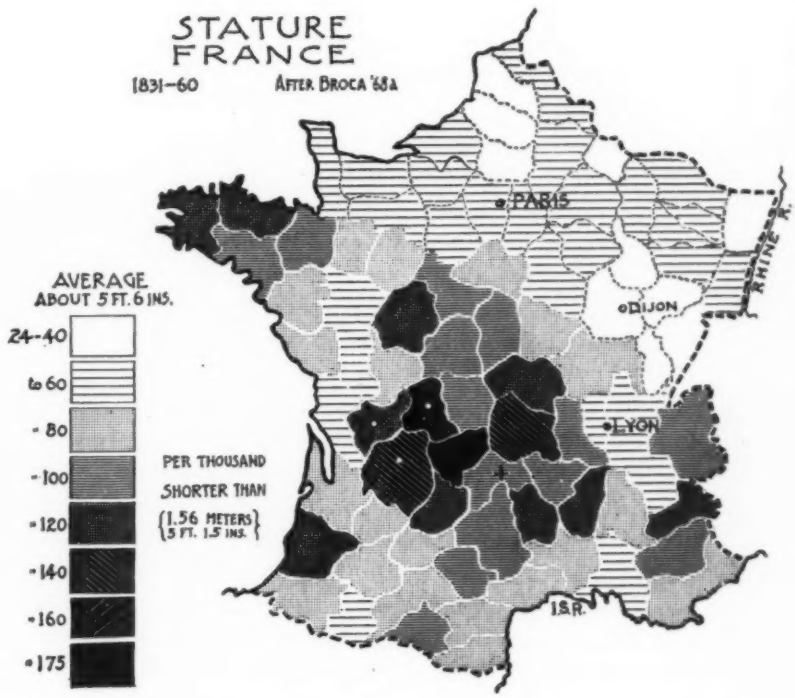
Suppose that we have decided upon the employment of eight grades of shading. How shall we effect the division of this range of 151 units, *viz.*, between 24 and 175 per thousand — into its eight grades, supposing that we have to do with 86 departments, as in the case of France? Broca, in his original map of stature used three shades only, each grade of tint being applied to one-third of the 86 administrative divisions. Thus, departments numbering 1–26 in the order of tallness of stature were made white; 27–52 were lightly shaded; and 53–86 were closely cross-hatched. In our first map, on the next page, precisely the same statistical plan was roughly adopted; although the number of divisions was increased from three to eight, thus assigning, approximately, 11 departments to each grade of tint. Following this plan, and having a table before us of the *pro mille* proportions for 86 departments, we designate the first 11 in order at the top by our lightest tint. It happens that the division falls, as the legend shows, at 41.2 per thousand. The first tint, therefore, has a range of 17.2 units, that is to say, from 24, the lowest proportion of defective statures, to 41.2 per thousand.

The second group of 11 departments similarly shaded carries us to a frequency of 52 per thousand, giving a range of 10.8 under the same tint. The third group of 11 departments happens to lie between the limits of 52 and 56.4 *pro mille* with a range of less than half the preceding one, or only 4.4. Thereafter the range of each similarly shaded group of 11



departments rises, as 8.6, 11.5, 16.1, and 15.4, respectively, until the last one reaches the maximum range from 108 to 175 per thousand. Nine departments, in other words, on this first map, as we see, are colored black, representing a range of 67 units per thousand (108 to 175).

The fallacy in this process is too apparent perhaps to need explanation; nevertheless it is surprising, in view of the simple principle involved, to see how commonly the error is committed, especially in the sciences which make but occasional appeal to statistical representation. The effect is at once obvious. The extremes of the statistical series, those departments within which the phenomena are respectively



most and least frequent, are shaded into undue geographical prominence and extent. Thus, for example, on this first map the areas of very short stature, characterized by great frequency of defectives, are much wider in their extension as visually represented than they are in fact. In other words, the restricted locality in which physical degeneracy really

culminates is generalized over a far larger area than it ought to be. The obvious fact that the phenomenon tends to aggregate about the mean or center is quite obscured at the same time.

The proper procedure in this case would seem to be not to divide the departments into shaded groups equal in number, but rather to divide the range of the phenomenon itself from least to maximum into equal groups. Thus, as on our second map on the preceding page, we make division at the round numbers of units per thousand, making each group of similar shading comprise 20 units per thousand, as the legend shows. The actual number of departments chancing to fall within each group of shading is left entirely dependent upon circumstances. All probability of course tends to make the middle groups numerically the most extensive, although this is not invariably the case. As it stands in this instance the number of departments represented as white on the map is 10; scarcely different from the number left white on the scheme used in the first map. This is a significant fact to be noted. The second shade, however, is far more extensive than in the former case, comprising no less than 26 departments instead of 11, as before; while the third tint covers 21 departments; the fourth, 15; the fifth, 10; the sixth, only 2; the seventh, not represented at all; and the eighth or solid black one covers only 2 departments. This distribution at once shows that the center of greatest frequency for the phenomenon in question really lies nearer the top of the scale than the bottom; in other words, that France, as a country, lies below the mean for the species in respect of stature. The commonest proportions, judged by that geographical distribution, lie in the vicinity of 60 defective individuals per thousand. This the map shows at once by its general light tone and shading, as it should. According to the first map, on the other hand, this center of distribution — or shall we say frequency — appears to be considerably higher at the middle grades of tint between black and white, namely, about 65 to

76 per thousand. This is obviously a falsification, to the eye, of the statistical fact, as a moment's consideration suffices to show.

The third point of principle to which we wish to direct attention is concerned with the lettering of the legend. This involves an error which is more frequent perhaps than either of the other two that we have mentioned. It arises more often from carelessness of the operator than from real confusion of thought. It is a fault which appears upon both of the two maps which have been reproduced herewith.

Suppose that the legend upon a map reads as follows: The first shade being labled "1–10," the second "10–20," the third "20–30," etc. At what point does the real division statistically occur? Is No. 10.0 included in the first group, or does this alone comprise Nos. 1–9.99, inclusive? One is always at a loss to interpret a scheme of this kind, especially when division occurs other than at a round number; and it is in all cases probably far better to avoid the possibility of ambiguity by the employment of some other method. The several groups may be lettered "1–9 inclusive," "10–19 inclusive," etc., or else, what is probably better, they should be labelled "1–9.99," "10–19.99," etc. In this last case there is no possibility of misunderstanding, and the mind of the observer is immediately set at rest. When this is not done, nine times in ten the assumption is perhaps justified that this is what the statistics meant; but cases are no means rare where the opposite meaning was intended, especially whenever the division falls, as we have said, not on the round numbers but at some odd figures, as one, our first map of France, for example.

Having treated of these few points of principle we may now proceed to consider matters of technique. The first method we will call that of "pasting tints." The materials necessary are a piece of stiff cardboard large enough for the map; tracing cloth or paper, carbon paper for transferring tracings; and India ink, or what is even better, Higgins'

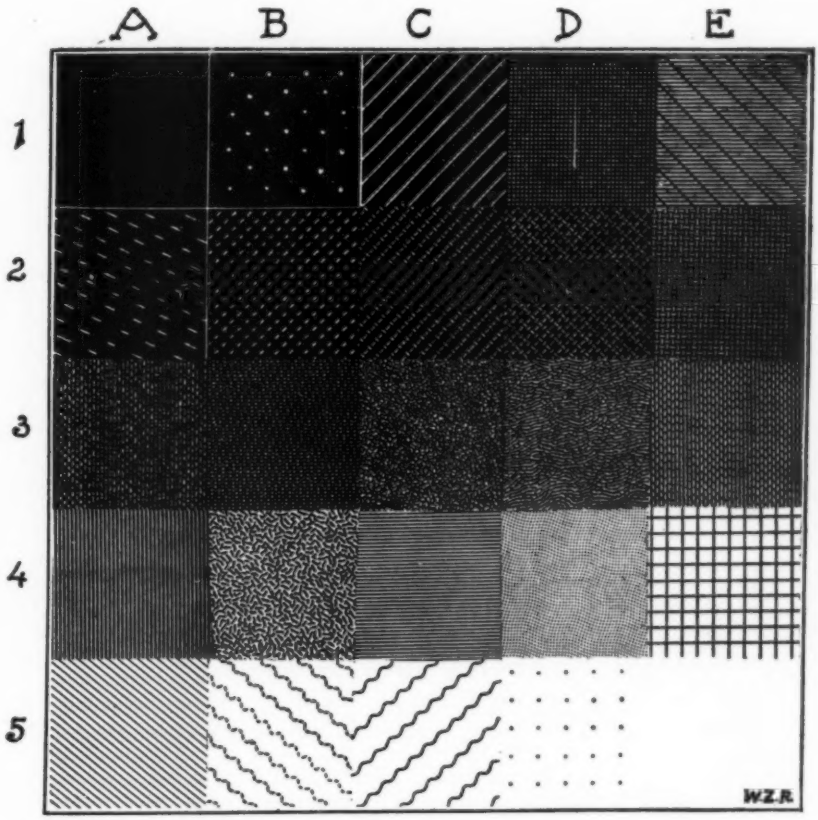
prepared drawing inks; sharp scissors, a keen pen knife, a bottle of China white water-color paint, some flour paste, or preferably Higgins' Photo-mounter, etc.; and finally a set of black and white printed tint papers, such as, for example, those illustrated by sample in the diagram on the next page.

Having decided upon the grades of tint which we will employ, in accordance with the above mentioned principles, the following steps should be taken: —

(1) Make an accurate tracing of the outlines of the map to be constructed, and transfer it by means of the carbon paper to the stiff cardboard. The reason for the employment of cardboard is, of course, to prevent the curling and warping of the paper in the process of pasting. It will be found advantageous at this stage of the proceeding to paste the tracing along one edge of the cardboard so that it will accurately register or overlie the map as transferred upon the pasteboard. Then it may be folded back out of the way, except when needed for purposes of location. If a sufficient number of maps are to be made, printed outlines may in many cases be procured of publishers. We have, for instance, had such outlines prepared for the State of Massachusetts by counties and towns, the city of Boston by wards, etc.

(2) Beginning at one corner of our proposed map, let us say the upper left hand (A1 upon the diagram on next page), make a tracing upon the prepared tint paper by means of carbon paper of the department, county, township, ward or other administrative division to be shaded; and cut out the paper accurately upon its *upper* and *left-hand* sides only, along the lines thus traced. If these boundaries be straight and simple, as, for example, in the north-west corner of Massachusetts, they may perhaps, as we have said, be best cut out along the traced line. If, however, the map be for photographic reproduction, or if the outside boundary on these sides be irregular, such as a coast line, it will be found simpler to let the piece of tint paper extend out indefinitely, say one-quarter of an inch, beyond the boundary of the map

all along. Then having pasted the paper in its proper place upon the cardboard, as indicated by means of the tracing which may be folded down over the cardboard for the purpose of locating the pasting slip, paint over with China white all of the tinted paper which projects beyond the boundary,



inking in the actual edge of the map of course to give a finished effect. It will be noticed that no attempt has been thus far made to cut the *lower* and *right-hand* edges of this first piece of tinted paper accurately along these boundary

lines of the department, the paper having been merely left to project well over into the adjoining areas. (B1, B2, A2, on our diagram on the preceding page.)

(3) Make a tracing of the outlines of the area A2 which we will suppose to represent the adjoining state, county, town, or ward, as the case may be; and cut out a piece of the appropriate tint paper again upon the *upper* and the *left-hand* sides only, as in the former case, along the line of the tracing. Here, again, the *lower* and the *right-hand* sides are left to project indefinitely, well over beyond the boundary of this particular area. Paste this second tint paper in place; first, along its upper and left-hand sides, locating it by means of the general tracing of the whole map which, as we have already said, has been pasted to the cardboard by one edge and temporarily folded back out of the way. This will enable the tint paper to be brought accurately into register in its appropriate place. The area B1 is then similarly treated; then B2, A3, and so on; each tint paper overlapping its neighbor upon two sides only. In other words, we are simply shingling the map like a roof from its upper left-hand corner down and out, thus avoiding the difficult task of exactly fitting respective edges of the pasted papers together. This overlapping of the paper is not apparent on a photographic reproduction, especially since in most cases the lines where the shades overlap will be indicated by a black and dotted boundary, afterward inked in. Thus we proceed till the whole map has been covered. When we come at last to the lower and right-hand edges of the whole map we may either, as in beginning, cut all four edges of the last shade papers accurately, before pasting them in place; or, if the boundary be irregular, we may allow the paper to project beyond, and then paint over the superfluous part up to the boundary line with China white. Wherever covered with the white paint the projecting parts will disappear in a photographic reproduction which only takes note of clear black lines.

At this point a word may be said respecting the process of transfer and tracing by means of carbon paper. It will be found advisable to avoid, so far as possible, all black lines upon the face of the shade papers, as they are likely to smut and are difficult to obliterate. For this reason tracings of the outlines may best be transferred to the tint papers, either by indenting the outline by means of a dull steel stylus, or else the outlines may be transferred in carbon upon the *back* of the tint papers; that is, by laying the carbon paper face up upon the table, upon it place the tint paper the boundary of which is to be cut out and on top of all the tracing. Then by running a pencil or a steel point around the boundary of the tracing the carbon transfer is made upon the back of the tint paper instead of upon its face with far better results in the finished map.

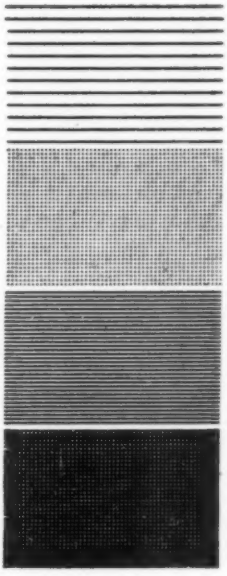
As for the tint papers to be used in this case a primary difficulty of course is to secure a sufficient variety of shades. Intermediate tones are common enough among artists' supplies in various forms, but we have found it necessary to make by hand a number of the darker shades, the varieties at hand being indicated within the diagram on page 9 to which we have referred. These must be adapted for each map, with an eye especially to the degree of reduction which is to be made by the photographer, as well as to the statistical contrasts which are to be sought. It is a well recognized fact that by choosing tints aright almost any desired effect of emphasis can be produced according to the skill of the manipulator. Most of these particular papers will stand a reduction anywhere up to "one-half off"; that is to say, a reduction of area of one-quarter, each dimension being halved. Many of the finer texured ones, however, will give far better effects with a less reduction, say "one-quarter or one-third off."

In the matter of shading it should be noted that the employment of flat colors, or tinting, except for solid black, renders the reproduction very much more expensive than in

those cases where a definite texture, either in black or other color, can be used. Wherever a texture, such as cross-hatching, dots, etc., can be employed, and where the reproduction is to be in black, the process of photo-engraving is possible, and the expense is relatively small. On the other hand, wherever flat tints, washes, or solid colors without texture are employed, it is necessary that the reproduction be by lithography or half-tone process, both of which are very much more expensive. For this reason it will be found far more advantageous to employ shades which have a texture such as those illustrated herewith than those of the other sort. Of course in drawing in any case the solid black areas are merely inked in with a brush, using a pure carbon drawing ink of the best sort. Ordinary writing ink is useless, as it gives a most imperfect black, full of faults in a photographic reproduction.

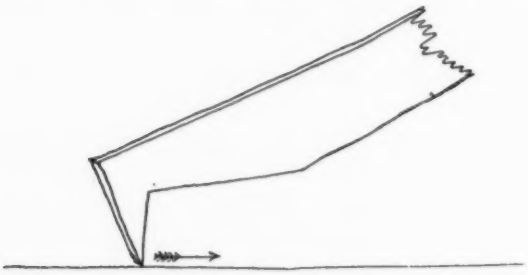
One more process somewhat more specialized deserves mention in conclusion. The credit for the original suggestion to me of this process is due to my artist friend, Mr. Frank B. Masters, who called my attention to the methods used in rapid illustration for newspaper work. Among these processes the best is perhaps the use of so-called Ross stipple-board. This is a paper with a thick clay surface minutely ribbed in one direction with black lines equally spaced at right angles to the ribs. Each black line upon this paper, therefore, runs up and down over a gridiron of ribs. To the eye this irregularity of surface is scarcely noticeable, and photographic processes take no note of them. Thus C upon our specimen diagram on the next page represents the paper as sold by dealers. Upon scratching it lightly with a broad sharp knife, the black lines are obliterated wherever they rise over and cross the ribs upon the paper, while the black remains in the intermediate hollows. By this simple means is produced the tint B. On the other hand, if rubbed with a pencil or greasy carbon the crests of all the ribs upon the paper are blackened throughout their whole length, producing

a series of cross lines at right angles to the original printed ones; thus is D produced. Of course all parts of the paper outside the map boundary are at the outset scratched white, a result easily produced, as the clay surface is intended for the purpose.

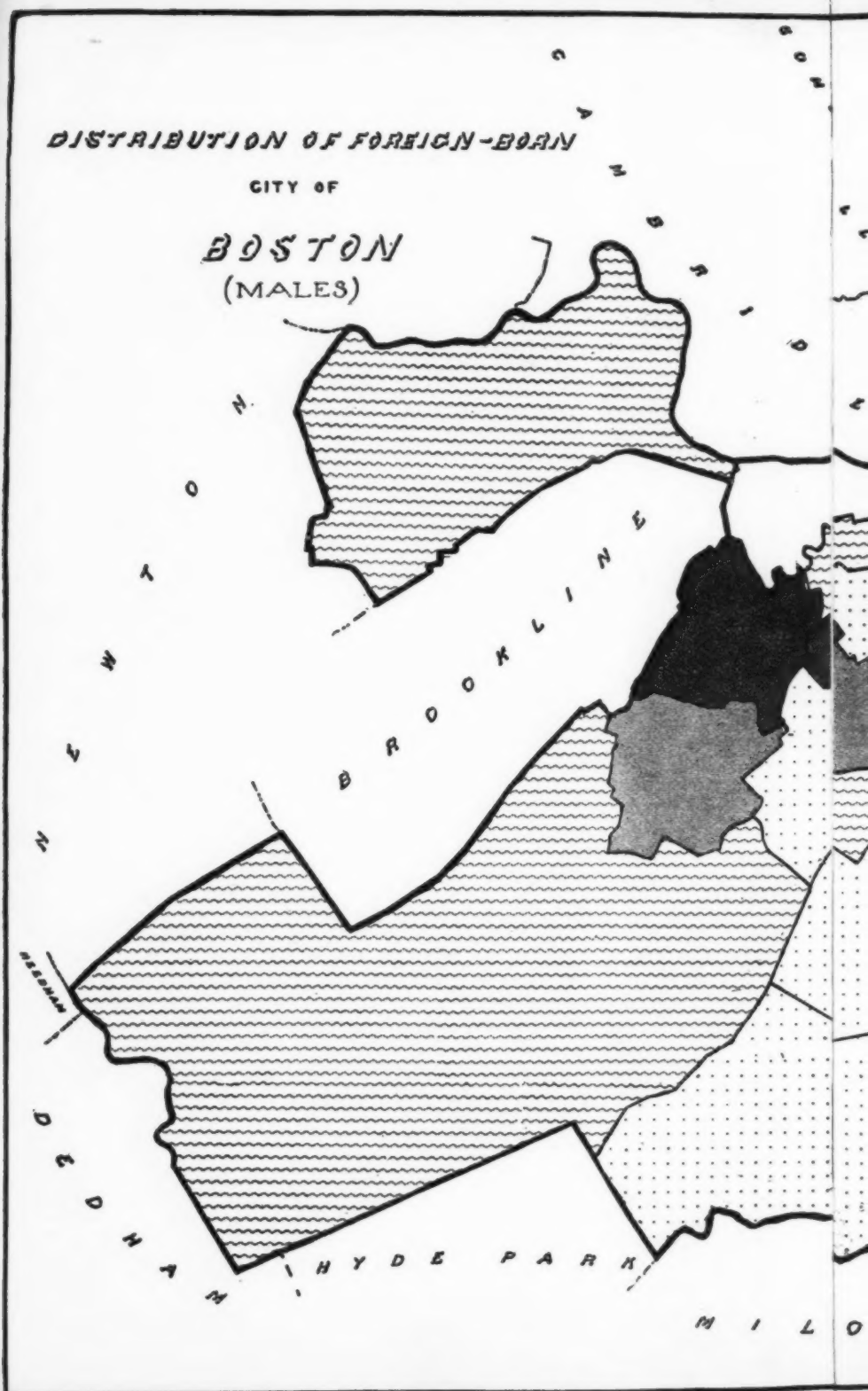


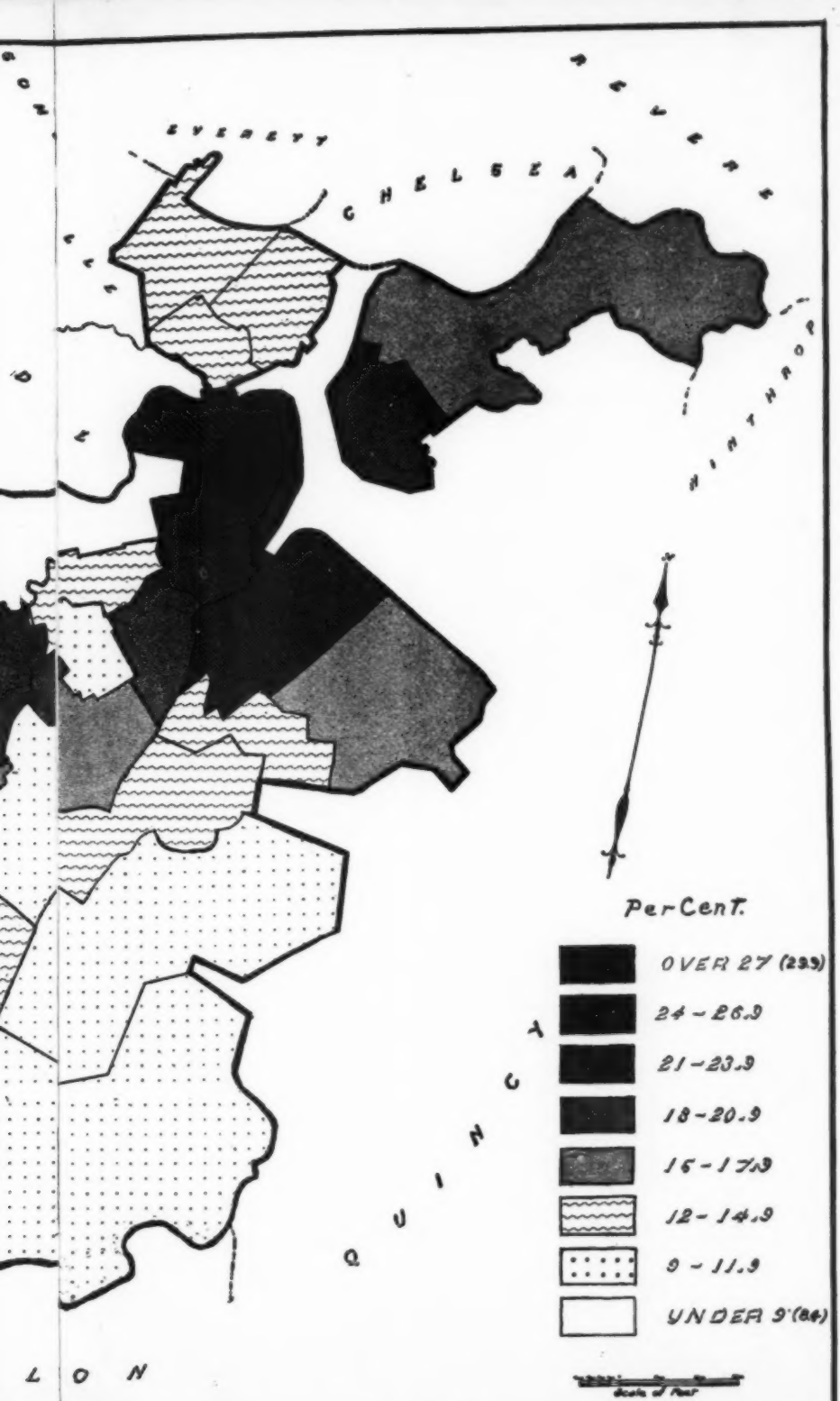
Beside these tints a number can be produced on Ross paper by various manipulations more or less complex and technical. Higgins' prepared or other India ink gives a solid color which may be punctured with white dots as in B1 (p. 9) by the use of a sharpened drill twirled between the fingers. This blackened space can also be scratched white in lines as readily as black lines are drawn with a pen. For this purpose we have devised a tool, shown in the cut on page 14, made from a bit of old saw blade or thin steel, ground to a chisel point. This is used with a ruler just as a pen to produce the effects; for example, shown in Nos. C1, A2 (p. 9). Or the Ross paper before being blacked may be deeply cut with this tool in any way desired and thereafter coated with ink

by brush. Thus the ink lines become deeply indented below the surface of the paper. Then if the whole surface be lightly scratched with a penknife, the tops of the original ribs on the Ross paper come out white, leaving the effect shown, for example, in No. E1 (p. 9). Finally by using the same steel tool, with a point of the right breadth, any desired number of intermediate black lines on the original Ross paper can be removed leaving a few widely separated ones with the effect of light cross-hatching, as in A on page 13. Such are only a few of the results possible. Ingenuity will enable others to be devised to fit the peculiar circumstances; and then of course, best of all, these results may be combined with those of the pasting tints previously described, so that almost any desired number of tints between black



and white may be obtained. All of these latter processes, however, and even the simple use of the Ross paper, presuppose more skill than the average student can acquire in a short time. Experience has shown that the simplest process gives the best results. The appended map, by wards, of the city of Boston represents the work of a first-year student at the Institute of Technology. It required about eight hours to make in the first attempt. This was photo-engraved with a reduction of about "one-half off," at a cost of, approximately, $4.00. Such work is easily within the powers of any student of statistics, and will be found greatly to increase the interest in research. It is merely a legitimate application of those laboratory methods which should receive far more consideration than is usual in many of our educational institutions.


DISTRIBUTION OF FOREIGN-BORN
CITY OF
BOSTON
(MALES)
NEWTON
BROOKLINE
DEDHAM
HYDE PARK
MILO


EVERETT
CHELSEA
WINTHROP
QUINCY
Per Cent.
OVER 27 (23)
24 - 26.9
21 - 23.9
18 - 20.9
15 - 17.9
12 - 14.9
9 - 11.9
UNDER 9 (84)

THE PORTUGUESE POPULATION IN THE UNITED STATES.

By Frederic L. Hoffman.

According to the United States Census of 1890 the majority of the Portuguese in the United States lived either in California or Massachusetts. In the latter State there has been for some years past a considerable increase in this class of foreigners, which according to the State Census of 1895 numbered 13,298 in that year. Taking the returns for 1895, it appears that of the last named number the majority, 7263, lived in the county of Bristol, which contains the three important cities of Fall River, New Bedford, and Taunton. The following table will show the proportion of Portuguese in the principal towns of Bristol County in 1895: —

Portuguese in Bristol County, Massachusetts.

	Total Population.	Portuguese.	Per Cent.
Fall River	89,203	1,707	1.9
New Bedford	55,251	3,861	7.0
Taunton	27,115	536	2.0

Hence the three large towns contain 6104 of the 7263 Portuguese in Bristol County, or 3.6 per cent of their population is made up of this class of foreigners. But because of this apparent concentration it must not be supposed that these people largely aggregate in large cities, for as a matter of fact they are largely employed as farmers and truck-gardeners in the suburban sections, as domestics or farm servants, and as fruiters all over the rural part of the county. Seven cities with a population from 2500 to 8300 contain 520 Portuguese, or 1.6 per cent of the total population, while the remaining part of the county, practically the rural portion, contains 639 Portuguese, or 4.2 per cent of the total population.

The Portuguese in Massachusetts are mainly from the Western Islands, including Madeira and the Azores. The latter islands in 1890 had a population of 389,634, or 314.9 to the square mile, while Portugal itself had a population of only 135.7 to the square mile. This over-population of the islands has for some twenty years at least led to a considerable emigration of Western Islanders to all parts of the world, but especially to the Sandwich Islands, Brazil, British Guiana, and the United States. For some curious reason the emigrants to the United States have mostly come from Fayal, San Jorge, and Flores, while those to the Sandwich Islands have come principally from Madeira, and those to Brazil from the islands of San Miguel, Santa Maria, and Terceira.

This distinction of the origin of the American-Portuguese immigration is of some importance in view of the fact that there may possibly be shown to be certain important differences in the racial types of the inhabitants of the different groups of islands. Since the possible African origin of these people is oft referred to, the following notes on their anthropology are of importance for a clear conception of the complex question of race origin and race mixture.

Elisée Réclus, who is generally accepted as a high authority, writes as follows in reference to the inhabitants of the Azores: "When first visited by the Italian and Portuguese navigators the Azores were found to be uninhabited. The pioneers of the colony founded in 1644 . . . . were some Moors, sent forward to test the climate of the country . . . . Afterwards the large owners of estates introduced with the white peasantry a certain number of black slaves, by whom a slight strain of black blood was transmitted to the other settlers." Jews were also sent to the colony, and some Flemish colonists, but the vast majority of the original settlers were pure Portuguese, which, however, probably came from different parts of Portugal, and thus may come the different characteristics of the inhabitants of the various islands. Thus, according to Réclus, the Azorians are far from present-

ing a uniform type, the greatest variety being presented by the different communities throughout the archipelago. "They are generally under-sized, with rather coarse features, large mouth, thick lips, ill-shaped nose, and cranial capacity decidedly inferior to that of the average European." Thus Réclus would seem to accept it as a fact *that the Azorians have a slight mixture of negro blood.*

In the same way after discussing the character of the people of Madeira, Réclus writes, "All these heterogeneous elements (Jews, Moors, Negro slaves, English, and Italian) became successively absorbed in the dominating Portuguese race, and nearly all the inhabitants have black eyes, coarse dark hair, and a swarthy complexion, far too general not to be attributed in many cases to a Negro strain." This agrees with a statement made in 1857 by the author of a *Handbook of Madeira*, in the following words: "The inhabitants of Madeira are of Portuguese descent, and are not distinguishable from their relatives in Portugal, save by a certain provincialism in their speech, and a somewhat dark tinge on the skin of the lower classes, *speaking of an admixture of African blood.*"

But what is said here of the Portuguese in Madeira and the Azores applies with much truth equally well to the native Portuguese and even the Spaniards, for in the words of Professor Ripley, "Beyond the Pyrennees begins Africa" and "the Iberian population, thus isolated from the rest of Europe, are allied in all important anthropological respects with the peoples inhabiting Africa north of the Sahara from the Red Sea to the Atlantic." Thus Ripley seems to accept the theory that the Portuguese in Portugal became inter-mixed with the Saracens and Moors during the occupation of the Peninsula by the latter, and that hence "the effect of a Moorish cross is apparent." We must, therefore, conclude that the Portuguese of Portugal, as well as those of the Western Islands, have become somewhat tainted by the inter-mixture with the races of North Africa, while some real

Negro blood, no doubt, crossed with that of the people of the Azores and Madeira several centuries ago. But this strain must be considered as unimportant from a physiological point of view, and does not, to my mind, represent a factor detrimental to the health or longevity of these people at the present time. It is a generally accepted fact that the people of Southern Europe can mix more readily and with less moral or physical injury with the Negro than the Teutonic races of Northern Europe.

But for these reasons some of the statistically supported conclusions as regards the comparative longevity of this class of people would seem impossible. Either the black strain is so very slight that it failed to deteriorate the Portuguese in the Western Islands, or the race mixture of Moors and true Negroes with the Portuguese proved a less serious deterioration than is the case in race mixtures of Anglo-Saxons with persons of the African race. Thus if we first compare the general mortality of the Portuguese in Portugal and the Portuguese in the Western Islands, we have the following results: —

COMPARATIVE MORTALITY OF PORTUGUESE IN PORTUGAL AND THE WESTERN ISLANDS. (Rate per 1,000 of Population.)

Portuguese in Portugal, 1895-96, ...	22.6
Portuguese in Western Islands, 1895-96, ...	22.2

According to this table the general mortality of the two groups of Portuguese people is practically the same.

But as a matter of fact the mortality of the Western Islands is actually less than that shown in the table, since the use which is made of Madeira as a health resort increases the local mortality considerably, so much so that Madeira has been termed a London cemetery. Considering the returns from Funchal, Madeira, for the eighteen months January–June, 1897–98, I am able to give the following table, through the courtesy of the United States consul at Funchal: —

MORTALITY OF FUNCHAL, MADEIRA, 1897–98. (Rate per 1,000 of Population.)

	Funchal.	New York City.[1] 1885–90.
Consumption	2.18	3.80
Respiratory diseases	3.23	5.63
Typhoid fever	0.85	0.23
All causes	27.22	28.47

[1] White population only.

It is thus apparent that from specific causes affecting the adult population, the mortality is lower in Funchal, regardless of the invalids from Europe, than in the city of New York. Comparing, for instance, the mortality of the people of Funchal with the mortality of the Irish and Germans in New York City, it appears that while the death rate for consumption is 2.18 per 1000 for Funchal, it is 6.49 per 1000 for the Irish, and 3.18 per 1000 for the Germans of New York City. Just so with respiratory diseases and typhoid fever, which latter disease, however, is comparatively frequent in the Western Islands. As regards the general mortality of Funchal my correspondent in a long report states the facts as follows: "Suffice it for me to say that among the poorer classes you find terrible poverty, nay even starvation, combined with every form of bad sanitation and excessively exhaustive work." "Consumption is on the whole fairly small in amount, and this is increased by imported cases." "Respiratory diseases are very common among the poor, who get wet through in the winter months, and have no opportunity of drying themselves, and altogether they are very thinly clad." But he adds, "Even among the poor, very old people are frequently found enjoying the best of health and capable of a great deal of exertion." The report was made especially for me by Doctor Krohn, who is thoroughly familiar with local conditions.

Other authorities agree very much on the general conclusions stated in regard to the mortality of the Western Islands.

Davidson says "Respiratory diseases are rather common among the laboring classes," while consumption is not at all uncommon among the lower classes, but rare among the upper classes. The mortality among children would seem to be high, though accurate data are wanting. Davidson says that tabes mesenterica is very fatal among ill-fed children of the poor, but scrofula is not of frequent occurrence. "Syphilis," he, however, adds, "is widely spread, but of a mild type." Among races which have been mixed with essentially unlike races, like the American mulatto or the Hawaiian half-cast, scrofula and syphilis are not only very common, but of exceptionally virulent type. Réclus agrees that the population increases rapidly by a natural excess of births over deaths, families being very numerous, and the death rate among children very low. The latter is hardly supported by some of the facts previously stated, still the mortality cannot be as heavy as among the colored population of our American cities. Of Madeira, Réclus writes that rickets, scrofula, consumption, and even leprosy prevail as in the mother country, but the mortality from these causes cannot be large, since there is a very considerable excess of births over deaths. (1896, 13,335 births and 8761 deaths.)

These facts are supported by the available vital statistics of the Western Islanders in the United States, Hawaii, and other countries. When the emigration from Madeira first commenced to British Guiana there was a very high mortality, but this was due entirely to local causes, especially to yellow fever and unfortunate conditions connected with the transportation of the emigrants. In course of time the settlers became adjusted to local conditions, and now with their descendents number 12,166, having increased from 6879 in 1881 to the 12,166 in 1891, being considered "a most valuable class of immigrants."

In Hawaii, Portuguese, especially from Madeira, have been settled as plantation laborers on the sugar estates since 1878. Including their descendants, at the present time there

are some 13,000. According to a high authority, "the Government built better than it knew" in bringing the Portuguese to the islands. The following table for the city of Honolulu will show that the general death rate of Portuguese is less by about one-third than the rate for the total population: —

MORTALITY OF PORTUGUESE IN HONOLULU. (Rate per 1000 of Population.)

	Total Population.	Natives of Portugal. (Western Islanders.)
Period 1891-97, . . .	24.4	16.5

According to this statement the average annual mortality of Honolulu during the period 1891–97 was 24.4, while, considering the Portuguese alone, the death rate was only 16.5 per 1000. Hence the Portuguese from the Western Islands were subject to a much lower death rate in the Sandwich Islands than the general population during the same period.

If we now consider the facts pertaining to this country we are confronted with a much-to-be-regretted paucity of data. As stated, the Portuguese population in Massachusetts is concentrated in the county of Bristol, and it is only for Fall River that I am able to give the mortality returns for a short period of years and for a small number of persons of this nationality living in that city: —

MORTALITY OF PORTUGUESE IN FALL RIVER, BRISTOL COUNTY, MASSACHUSETTS. (Rate per 1000 of Population.)

	Portuguese.	Total Population.	Canadian.	Ireland.
1891.....	3.5	23.5	9.1	32.2
1892.....	7.0	23.5	9.3	30.6
1893.....	10.0	23.2	8.9	29.2
1894..	13.5	23.5	8.7	29.4
1895.....	14.6	21.3	9.9	26.7
1896.....	21.7	23.8	14.4	26.3
1897.....	11.7	22.3	13.4	30.1
1891-97.....	11.7	23.0	10.5	29.2

It appears from this table that the average annual death rate of the Portuguese, largely Western Islanders, was 11.7 per 1000, against a rate of 23.0 per 1000 for the total population. The high average for the total population is no doubt due to the excessive mortality of the Irish, which show a death rate of 29.2 per 1000, while the sturdy Canadians show a mortality of only 10.5 per 1000. Hence the returns for the Portuguese are indicative of a low mortality among this class of foreigners in the city of Fall River during the past seven years.[1]

The conclusion is warranted that on the basis of the local mortality statistics for the Western Islands; on the basis of the mortality statistics for the Hawaiian Islands, where these people have largely settled; on the basis of the returns for the city of Fall River, and on the scanty material in the possession of insurance companies, the mortality of Portuguese, especially Western Islanders, is below the general mortality of Portuguese in Portugal, and considerably below the mortality of the Irish and Germans in the United States.

To these facts pertaining to the mortality and disease liability of the Portuguese population, I add a few statements and statistics relative to the moral and material condition of the Western Islanders as they have been brought out in various investigations into their social and industrial capacities, and although the subject received public attention in a valuable report of the Massachusetts Bureau of Labor on the *Social and Industrial Changes in the County of Barnstable* (27th annual report, 1897), the following extracts and statistical tables will be of interest and value as confirming the conclusions arrived at by other investigators.

In a work on Madeira, published in 1857, a well-informed writer states, "While the lower classes of Madeira are sober, good-tempered, and cheerful, notwithstanding the privation

[1] The age distribution of the population is somewhat in favor of the Portuguese, but not sufficient to affect the much higher death rate of the Irish. The mortality by ages cannot be stated according to nationalities.

of their lot, they are grossly superstitious" (p. 73), and "acts of violence seldom occur, and the most heinous crimes are seldom committed. Petty thefts, however, are common, and strict integrity is nearly unknown." In this manner most writers have expressed their high regard for the Western Islanders, as a hard-working, patiently toiling, uncomplaining, and law-abiding class of people. Thus Earl Grey in 1852 referred to the immigration from the Azores into British Guiana as "this invaluable class of immigrants." William N. Armstrong, as Immigration Commissioner for Hawaii in 1882, wrote of the Portuguese from the Western Islands, "these people are excellent laborers." Prof. W. Alexander, in a paper before the Honolulu Social Science Association in 1895, referred to the Portuguese in the islands as follows: "They are the most valuable accession yet made to the population of this country"; and further, that "their industry and thrift need no praise from me while the reports of the Chief Justice credit them with the lowest percentage of crime of any nationality in the islands."

So, also, in a report made by the United States consuls in 1885 on labor in Europe, it is stated of the laboring people of the Azores: "The habits of the Fayalese working classes are fair. They are temperate, and although making use of wine and spirits, drunkenness is by no means common. The agricultural population is decidedly a steady one, and necessarily frugal. When abroad in countries where good wages are to be had they are very saving, and those who return, or a large majority of them, bring with them good results of their labor and thrift" (vol. ii, p. 1648). Mention is made of the existence of a coöperative society in Fayal, which requires weekly payments to be made, and which would have been more successful but for the poverty of the people.

Again, as to the Western Islanders in southeastern Massachusetts, the probation officer of New Bedford stated before the Massachusetts Commission on the Unemployed in 1894, "They are generally very prudent and good citizens," while another witness from New Bedford stated, "They are very

thrifty." These statements may be supported by statistical data, of which I give two significant items below.

It is a well recognized fact that a low state of morality among civilized people is invariably coincident with a high rate of mortality. It is thus that the Negro in the United States is among the least moral, and at the same time the most liable to disease and death, while the Jews are among the most moral, and at the same time enjoy the largest share of human longevity. Thus it is of importance to note that the ratio of illegitimacy among the Portuguese in Portugal is 15.1 per cent of the total number of births, while it is only 5.1 per cent among the Western Islanders, which is a ratio about 2 per cent higher than that of the white population of Washington, D. C. Thus while it is safe to say that the mortality of the Western Islanders is lower than that of the Portuguese in Portugal, it is certain that the morality of these people is very much higher than that of the natives of Portugal in their home country. In support of the statement that crimes and acts of violence are less common among the Western Islanders than among other nationalities, I add the following table for Massachusetts, showing the proportion of persons committed to jails and houses of correction during 1898, according to selected nationalities: —

PRISONERS COMMITTED TO JAILS AND HOUSES OF CORRECTION IN MASSACHUSETTS, 1898.

Nativities.	Population. (1895)	Prisoners. (1898)	Ratio per 10,000.
Portuguese	13,298	14	10.5
Western Islanders only	9,898	4	4.0
Natives of France	3,742	35	93.5
" of Poland	7,277	89	122.3
" of Sweden	28,541	280	98.1
" of Ireland	258,247	7,443	288.2

Thus it is shown that the natives of the Western Islands in the State of Massachusetts are the least criminally inclined of the nationalities stated, while including the Portuguese from Portugal the ratio is only 10.5 per 10,000, against 288.2 for the Irish.

REPORT ON UNIFORM FINANCIAL SCHOOL REPORTS.

The following report was submitted by a special committee of the National Education Association to the Department of Superintendence at a meeting recently held in Columbus, Ohio: —

Your committee, appointed at the Chattanooga meeting of this body to report upon some uniform style of financial school report for the use of cities or school districts, and also upon some form suitable for the use of State school systems, begs leave to report as follows: —

The committee has not found it practicable to have a meeting of its members before coming to Columbus. Discussion of the matters committed to it has been carried on by correspondence, both between members of the committee and with others.

The printing of this report, so that it might be in the hands of the members of the department at this meeting, was authorized at the time this committee was appointed, but, in view of the fact that the members have not been able to meet for final discussion of the matters intrusted to them until the assembling of the department in Columbus, it seemed best to have printed only the proposed form.

It is not probable that any form for financial school report could be presented which would be entirely satisfactory to everyone. Your committee is of the opinion, however, that most persons would agree on nearly all important items, and that an agreement should be made throughout, even though, to some, the classification of a few minor items seem arbitrary or incorrect.

While local conditions enter into necessities for expense in any public school system, yet one of the most useful means of estimating proper expenditures, and the necessity for particular expenditures, should be afforded by a study of the financial school reports of other similar cities or districts. As these reports are at present made, they are of little use in this respect. Items given in one report are omitted from another. Items of income or outgo are differently grouped in different reports, and the statement is made in such a way that it is impossible to separate the items for the purpose of reclassification. In getting the cost of education per child, different items are put into the total cost of education, which forms the divi-

dend, while sometimes the divisor is the number enrolled, sometimes the average number in daily membership, sometimes the average number in daily attendance.

One of the chief studies of a wise administrator of schools is to make the cost of education per child as low as consistent with the best service. Attention to this and to a comparative study of reports for a period of years, now that most of our school systems have become established on a somewhat similar plan, should give an idea of the average or normal cost of education per child. Having this, the manager of schools may know how expense in his system differs from this normal standard, and, if not normal, why it is above or below. This knowledge cannot be arrived at, however, until the same items are included when computing cost of education and the same divisor is used in obtaining the average. By careful comparative study, railroad men know the average cost of hauling freight per ton per mile, and the cost per mile of transporting a passenger. Those administering schools should be as well informed upon the cost of education.

The two things which one studying a report of school finances most desires to know are, first, the rate of direct local taxation for schools borne by the community reporting, and, second, the average cost per child per year for the usual educational expenses. There are many items which, when given, are explanatory of these two, and serve to correct the inferences which might be drawn from a bald statement of them. There are also many items, not directly related, which aid in giving a correct estimate of the conditions surrounding the school organization reporting.

PROPOSED FORM FOR

REPORT OF THE SCHOOL RECEIPTS AND EXPENDITURES OF THE CITY

(OR SCHOOL DISTRICT OR SCHOOL CORPORATION)

of_____ for the year ending_____ 19__

1. Estimated actual value of all property in the city (or school district or corporation).....		$.....
2. Assessed valuation of all property in city (or school district or corporation).....		.....
3. Rate of school tax levied on each dollar of assessed valuation of city (or school district or corporation).		.....
RECEIPTS.		
4. Received from State apportionment or taxes.....	$.....	
5. Received from county apportionment or taxes.....	.....	

6.	Received from city (or school district or corporation) taxes			
7.	Received from fines, licenses, penalties, etc			
8.	Received from all other sources except loans and bond sales. (Specify different sources)	$		
9.	Received from loans			
10.	Received from bond sales			
11.	Total receipts, all sources			
	EXPENDITURES.			
12.	Paid for salaries of teachers and supervisors			
13.	Paid for other current expenses, excluding interest :—			
	Salaries of officers			
	Janitors			
	Fuel and lights			
	Text-books, including copy and drawing-books			
	Stationery			
	Other supplies for schools			
	Ordinary repairs to buildings, etc			
	All other current expenses			
14.	Paid for sites			
15.	Paid for additions and new buildings			
16.	Paid for permanent furnishings and furniture			
17.	Paid for permanent equipment for manual training, science laboratories, etc			
18.	Paid for reference and library books			
19.	Paid for all other permanent improvements, such as grading, paving, etc. (Specify different expenditures)			
20.	Paid for interest			
21.	Paid on principal of loans			
22.	Paid on principal of bonded debt			
23.	Total paid out, all purposes			
24.	Cash on hand at beginning of year			
25.	Cash on hand at beginning of year in fund for sites and buildings. (Included in 24)			
26.	Cash on hand at beginning of year in sinking fund. (Included in 24)			
27.	Warrants outstanding, beginning of year			
28.	Cash on hand at end of year			
29.	Cash on hand at end of year in fund for sites and buildings. (Included in 28)			
30.	Cash on hand at end of year in sinking fund. (Included in 28)			
31.	Warrants outstanding at end of year			
32.	Paid current expenses, evening schools. (Included in 12 and 13)			
33.	Paid current expenses teachers' training schools. (Included in 12 and 13			
34.	Paid current expenses, schools for defectives or other special schools. (Included in 12 and 13. Specify different schools)			

35. Bonded school debt of city (or school district or corporation) at end of year ....
36. Population of city (or school district or corporation).. .....
37. Persons of school age.....to.....years, inclusive, in .....city (or school district or corporation).....
38. Number pupils enrolled, all schools..... ... .
39. Average number in daily membership, all schools... .....
40. Average number in daily attendance. all schools..... .....
41. Average number in daily attendance, night schools. (Included in 40)..... .....
42. Average number in daily attendance, teachers' training schools. (Included in 40)..... .....
43. Average number in daily attendance, schools for defectives or other special schools. (Included in 40. Specify different schools)..... ....
....
44. Annual cost of education per pupil. (Sum of Nos. 12 and 13 divided by No. 40)..... ..... $.....

In arranging the proposed form an attempt has been made to group items so that the two prime facts which such a report may show may be easily determined; and to give, in addition, information of interest and use in such comparative study of income, outgo, and conditions as those charged with the management of school systems find it profitable to make.

The heading of the blank form was, at the suggestion of members of the committee, made to cover cities, school districts, or school corporations. In some cases the city and the school districts have the same boundaries; in other cases the school district covers territory not included within the limits of the city; in some cases the title varies, and the school district is called a school corporation. The proposed heading will permit the form to be used not only for cities, but for any school district, or for any form of organization the purpose of which is to carry on public schools.

Taking np the items of the form, Nos. 1, 2, and 3 serve to show the rate of local school tax, and to determine how this rate in one system of schools compares with that in another. The proportion of the true value at which property is assessed for purposes of taxation varies so in different States and different cities that all of these items are necessary that a comparison may be made. A tax of seven mills on the dollar, where property is, as in some cases, valued for taxation at only one-tenth of its actual value, is really much lower than a tax of four mills in a city where property is valued for taxation at two-fifths its actual value. The tax of seven mills on the one-tenth

valuation might be increased on the same valuation to a tax of sixteen mills before it would be as great in reality as the four-mill tax on the two-fifths valuation. A tax of six mills on the dollar where property is assessed at one-fourth its actual value is in reality only one-half as great as a tax of three mills where property is assessed, as in Massachusetts and in some other States, at its full actual value. With the figures given in Nos. 1, 2, and 3, valuation and tax rate may be reduced to a common basis, and fairly compared.

Under the head of receipts, the ordinary and extraordinary sources of income are separated. The ordinary sources, items 4, 5, 6, 7, and 8, serve to explain each other, and also to explain No. 3. In some States little or nothing is received from State distribution or funds; on the other hand, in at least one commonwealth, this State school fund is so generously endowed that, with prudent care, it should, in the future, carry a large part of the expense for public education. Where this source of income is large, the necessity for local taxation is correspondingly reduced. In cases where the county figures to a considerable extent as the unit of taxation the necessity for tax in the local school district is likewise lessened. In many cases the amount received into the school fund from fines, licenses, and penalties is considerable. On the other hand, this source of revenue is sometimes large, in some cases even providing the greater part of the funds needed for the maintenance of the schools. Where such a condition as this exists, the necessity for taxation, of whatever sort, is materially reduced. Cities or districts sometimes have unusual or temporary sources of income — gifts or bequests, interest on permanently invested funds, tuition of non-resident pupils, etc. These items, indicated in No. 8, serve to put all the facts before the reader of the report.

Receipts from money borrowed and from the sale of bonds are not natural or regular sources of income. The receipts from the sale of bonds are generally to be applied to some particular purpose, usually the purchase of sites and the erection of buildings. Income from loans is a temporary makeshift. Nevertheless, these two items must be reported to give a correct understanding of the situation.

Expenditures seem to fall into three classes: the usual current expenditures necessary for the maintenance of the schools; expenditures for sites, buildings, permanent improvements, and equipment; other

expenditures which, for various reasons, are not put in either of the two preceding classes.

For the purpose of this report the first of these classes is by far the most important, for it would probably be conceded that from this item of current expenses should be determined the cost of education per child, the most important item to be shown. Most of the difficulties in preparing such a form as is here proposed are met in the attempt to agree upon the items which should be included and those which should be excluded from item 13. Item 12 is simple, including only expense for regular and special teachers, and for those engaged in supervising or directing the work of instruction. An agreement is easily reached upon most of the elements making up the total in No 13. Here, without doubt, belong all expenditures for salaries of executive officers of the board; salaries of janitors; fuel; light; water, where this is purchased; material and labor for ordinary repairs to buildings and premises; the care of grounds; text-books, where these are owned by the school board; school stationery; school supplies, both those of janitors and those used in the work of instruction; cartage and freight; advertising; election expenses; school census; legal expenses; postage; telegraph and telephones; etc. Your committee would also include sums paid for rooms or ground rented for the use of the schools. It may seem inconsistent to include rent here, while excluding interest paid, and interest estimated on value of buildings and grounds used for school purposes. Rent, however, is seldom a large item, and it seems best to class it as current expense.

Actual usage as to items included in "cost of education" varies widely in different cities. Perhaps in one case only part of what is included in No 12, simply the expense for teachers, is included. In another city the cost of instruction and supervision, all of No. 12, is included, and this is reported as "cost of education." Sometimes to these items is added cost of janitors, fuel, and school supplies, while all other items are omitted.

It has been urged that to the items grouped under No. 13 should be added the sums paid for interest, and also a sum for interest, estimated at the current rate, upon the value of all grounds and buildings owned by the school district and used for school purposes. The item of interest paid upon bonds or upon temporary loans has been

arbitrarily excluded from No. 13. This has been done because interest is not directly an expense for educational ends; because in many cities no debt exists and no interest is paid. If the item is included, it will in some cities weigh unduly in the showing of the cost per child. Whether school buildings and grounds shall be purchased by direct appropriations of funds from the school treasury, or by funds derived from the sale of bonds, is a matter regulated by each community for itself, under state laws, and one plan or the other is followed, as the particular community considers advantageous. The matter is largely out of the management or control of those directly charged with administering the schools. Your committee has, therefore, recommended this exclusion.

The question might be raised as to including in No. 13 the interest upon estimated value of buildings and sites and permanent equipment. While it is true that the community is permanently deprived of the use for other purposes of the sums invested, its inclusion would be a wide departure from any prevailing usage. Estimates of the value upon which interest should be computed would vary largely, as one person after another, in different years, was called upon to make the estimate, and the item would become a variable factor, causing apparent cost of education to show strange increase or decrease. Your committee has, therefore, considered it wiser to exclude both interest paid and interest estimated from "cost of education."

Items 14 to 19, inclusive, show permanent investments in plant. The items are separated, because it is desirable to know amounts expended for each purpose. Some little perplexity may arise in classifying expenditures under Nos 16 and 17. Probably window shades and poles, and carpets, should go under 16, while door mats should go with brooms under 13. The repairing or replacing of shades should probably go under 13 also. Maps, charts, globes, etc., with all original fitting up of laboratories and workrooms, as well as additions of permanent pieces of apparatus, belong under 17; while the repair of apparatus and the replacement of the daily consumption and small breakage of laboratory material and utensils should be counted under 13, as should rebinding and repairs of library and reference-books. Bookcases, etc., an improved heating plant, a new system of ventilation put in a building, fall naturally under 19.

Items 20, 21, and 22, not placed with either of the foregoing classes of expenditure, are desirable for information, and are therefore included.

Although this form for report does not resemble a book-keeper's balance sheet or exhibit, yet item 24 is desired as a matter of information, as is also item 27. Items 25 and 26 are necessary to give a correct understanding of the significance of item 24. Items 28 and 31 are also desired as items of information, important as giving a full knowledge of the situation which exists in the reporting district. Nos. 29 and 30 modify considerably the significance of 28.

Items 32, 33, and 34 give an opportunity to estimate the cost of ordinary schools, free from complications with the unusual schools indicated in these items. They also give information as to what extraordinary educational responsibilities are assumed by the community.

Item 35 is inserted simply as information often desired, but frequently omitted from school reports.

Item 36 sheds light on the item following, and both of them are things well to be known when considering items 38, 39, and 40. These facts are not all strictly related to finances, but help in a view of the whole situation. They should often be borne in mind as correctives when considering items 3 and 44.

Items 41, 42, and 43 bear the same relation to 40 that 32, 33, and 34 do to the sum of 12 and 13. They permit the cost of education for the common schools to be separated and computed apart from that of the schools for special classes or purposes indicated in 41, 42, and 43.

There will no doubt be criticism of the selection of No. 40 as the divisor in obtaining No. 44. Both No. 38 and No. 39 were considered.

No. 38 varies so in different cities in proportion to the school population, and the average number of days each pupil enrolled is in attendance during the year varies so, that this does not seem to provide a divisor that is in any degree stable or reliable. Neither does the enrollment, in any great degree, determine the number of teachers or the school accommodations necessary.

For many reasons No. 39 seems the most suitable divisor. If computed in a uniform manner, the figures showing number in average daily membership would most nearly show the requirements for schoolrooms, furniture, supplies, and teachers. But it is not true

that these figures are obtained by the same processes, or based upon the same facts, in different school systems. Usage varies so in computing membership in different schools — pupils in some cases being counted as members of the schools, when in other cities the same state of facts would cause the child to be considered as no longer a member of the schools — that fair comparison is apparently not practicable by the use of this divisor.

Your committee is of the opinion that a divisor as little subject to misunderstanding as possible, and one based upon facts which are obtained in the same way everywhere, is of the first importance. The members believe this is provided by item 40, and we have, therefore, made that item the divisor to be used, in connection with items 12 and 13, to obtain what shall be known as the "cost of education."

Your committee further recommends that the accompanying form for reports of cities or school districts be used as a basis for uniform financial reports by State superintendents of public instruction.

Your committee finds it impracticable, without further time than has been at the disposal of its members, to present a suitable form for report showing important facts as to finances of State schools and educational institutions other than public schools.

Respectfully submitted,

C. G. Pearse.
W. W. Stetson,
John R. Kirk,
C. A. Babcock,
C. M. Jordan,
E. B. Prettyman,
D. M. Geeting,

Committee on Uniform Financial Reports.

MISCELLANY AND NOTICES.

MEMORANDUM ON EFFORTS TO DETERMINE THE AREA AND POPULATION OF THE PHILIPPINE ISLANDS.[1]

Area.— The accuracy of any determination of considerable areas, such as these islands, depends on —

1. The accuracy of the surveys.
2. The accuracy of the maps constructed from these surveys.
3. The accuracy of the measurements made on the maps.

About the progress and trustworthiness of the *surveys* of the Philippine Islands I have thus far obtained no specific information. Doubtless they are very imperfect and inaccurate.

The maps which have been used for determinations of area, so far as I have ascertained, are these: —

1. An undetermined map made prior to 1858 and the basis for the official Spanish measurements contained in the *Anuario estadistico de España* for that year.

2. The map contained in Francisco Coello's *Reseñas geografica*, etc., *de España*, published for the Statistical Commission of Spain, at Madrid, in 1859.

3. The Spanish Hydrographic Map, the date and title of which are unknown to me.

4. The map made by B. Domann, under direction of F. Blumentritt, and accompanying the latter's paper on the "Ethnography of the Philippines," 1882.

The measurements of area which have been made from the foregoing maps are as follows: —

1. The official Spanish figures dating back at least to the Spanish Statistical Year-Book for 1858 and found in that volume.

2. A measurement made from the map in Coello's *Atlas* by F. Jagor, the results of which are found in *Zeitschrift der Gesellschaft für Erdkunde zu Berlin*, viii, 1873, Heft 3.

3. A measurement made by the same man from the Spanish Hydrographic Map and published in the same place.

[1] The information contained in this memorandum has been derived mainly from the successive issues of *Die Bevolkerung der Erde* contained in the supplementary volumes of Petermann's *Mittheilungen*.—W. F. W.

[NOTE.— The main results of measurements 2 and 3 for the larger islands are found in F. Jagor. *Reisen in den Philippinen*, 1873, but not in the English translation.]

4. A measurement made in Perthes *Geographischer Anstalt* from the Blumentritt-Domann map.

An attempt to collate the results of these measurements for the larger islands follows : —

AREAS OF THE MAIN ISLANDS OF THE PHILIPPINES IN SQUARE MILES ACCORDING TO FOUR PRESUMABLY INDEPENDENT MEASUREMENTS.

Islands.	Official Spanish Figures.	Jagor's Measurements.		Perthes Measurements from the Domann Map.
		From Spanish Hydrographic Map.	From Map in Coello's Atlas.	
Luzon	42,840	41,100	41,125	40,900
Mindanao	32,720	34,560	33,380	37,190
Palawan	5,349	5,005	?	4,578
Samar	4,702	4,848	5,028	5,169
Panay	4,553	6,749	4,746	4,636
Mindoro	3,726	3,870	3,940	3,936
Leyte	3,669	3,472	3,591	2,717
Negros	3,362	4,844	3,478	4,673
Cebu	2,288	1,618	2,216	1,814
Entire group	114,130	114,650	112,550	114,360

In 1888 the Spanish official publication, *Reseña geog. y estad. de España* declared that the area of the islands was not even approximately known, and only for Luzon and the neighboring islands could it be given with confidence.

It is probable that the Blumentritt-Domann map is the most accurate of the four, and practically certain that the measurements made from it were more careful and accurate than those in the other three cases. Hence if any one of the foregoing must be used the last column is to be preferred.

The population of the islands in 1872 was stated in a letter to *Nature* (6 : 162), from Manila, by Dr. A. B. Meyer, who gives "the latest not yet published statistics" as his authority. The letter gives the population of nine islands, as follows : —

Luzon	4,467,111	Negros	255,873
Panay	1,052,586	Samar	250,062
Cebu	427,356	Mindanao	191,802
Leyte	285,495	Mindoro	70,926
Bohol	283,515		

It also gives the population of each of the 43 provinces of the islands. The population was not counted but estimated. The number who paid tribute was stated as 1,232,544. How this was ascertained we are not informed. The total population 7,451,352 was approximated "on the supposition that about the sixth part of the whole has to pay tribute." In reality this population is 6.046 times the assigned tribute paying population.

But Dr. Meyer adds: "As there exist in all the islands, even in Luzon, independent tribes and a large number in Mindanao, the number of 7,451,352 gives no correct idea of the real population of the Philippines. This is not known at all and will not be known for a long time to come."

Since 1872 there have been actual enumerations of the Philippines, but authorities differ as to the time when they occurred and the detailed results. These enumerations were usually confined to the subject and Catholic population and omitted the heathen, Mohammedan and independent tribes.

Four reports of the *entire* population have been printed: —

1. A report made by the religious orders in 1876 or 1877 in which the nationalities and creeds of the population were distinguished.

2. A manuscript report to Professor Blumentritt of the enumeration made by the religious orders in December, 1879.

3. The official report of the civil census of December 31, 1877, contained in *Reseña geog. y estad. de España*, 1888, p. 1079.

4. The official report upon the census taken by the civil officers December 31, 1887, and printed in the first volume of *Censo de la Poblacion de España*, at Madrid, in 1891.

The *first two* may be compared and tend somewhat to corroborate each other as follows: —

		1876–77.	1879.
1. Tribute-paying natives	5,501,356		
2. Army	14,545		
3. Navy	2,924		
4. Religious officers (Geistlichkeit)	1,962		
5. Civil officers	5,552		
6. Other Spaniards	13,265		
Total Spaniards	38,248		
Total Catholics		5,539,604	5,777,522
Heathen or Mohammedan natives.		602,853	632,645
Foreigners (in 1876 there were: British 176, German 109, Americans 42, French 30)		378	592
Chinese		30,797	39,054
Total		6,173,632	6,449,813

The *third* enumeration reported 5,567,685 as the tribute paying population. To this number should be added the estimated number of the independent tribes, "Indios no sometidos"; this according to the missionaries' count was about 600,000, making a total of 6,167,685. Most experts agree that this official report is untrustworthy and involves serious omissions, but believe that the facts are so imperfectly known that they are unable to correct it.

One author, del Pac, writing in 1882, started from the missionaries' census of 1876–77, *viz.*, 6,173,632, assumed that this omitted as many as 600,000 members of independent tribes and that the increase of 1876–82 would be 740,000. In this way he got 7,513,632. A second writer, Sanciano,[1] estimated the population in 1881 as 10,260,249.

The missionaries made an estimate of their own in 1885 which showed 9,529,841.

The *fourth* enumeration of those mentioned above showed a population of 5,985,123 in 1887, and the totals both for the group as a whole and for the fifty odd provinces tend to confirm and to be confirmed by the civil count of 1877. This number, however, represents only the nominally Catholic or tribute-paying population. To it must be added the Mohammedan or heathen tribes set down by clerical authorities as about 600,000. Perhaps the highest authority in this field, Professor Blumentritt, is confident that this number does not include all the independent tribes but only those in the mountains who have a special arrangement freeing them from all the dues of the subject tribes. On the whole, therefore, Professor H. Wagner is inclined to estimate these omissions of independent or non-Christian tribes at about 1,000,000 and the population of the group at about 7,000,000. This result is endorsed by the latest German authority, Hübner's *Geographisch-Statistische Tabellen* for 1898, which gives the population as $5{,}985{,}124 + 1{,}000{,}000 = 6{,}985{,}124$.

Personally I am disposed to suspect that this number, although called by Professor Wagner an outside estimate, is below rather than above the truth. In favor of this position it may be urged that Professor Wagner's estimate makes no allowance either for the natural increase of population, 1887–1898, or for the fact that the first careful census of densely populated regions, like India and Japan, usually reveals a

[1] Sanciano, *El Progreso de Filipinas*, Madrid, 1881.

larger population than had been previously estimated. This analogy might reasonably be applied to Luzon and the Visayas. Against my opinion it may be urged that the rebellion in the islands and the disorders attending it may have prevented any increase or even caused a decrease of the total population. How much weight should be given to this consideration I am unable to say.

Census Office, June, 1899. W. F. WILLCOX.

NOTES CONCERNING THE RATES OF INTEREST IN CALIFORNIA.

The layman might suppose that it is easy to ascertain the rates of interest on money lent which have prevailed at different times and in different places. Such a supposition would, however, be far from the truth. Every economist discovers, sooner or later, that among the data which he most frequently requires for use in his work few are harder to obtain than the average rates of interest. To be sure the daily papers and the financial journals give us the asking or published rates of interest in different cities for several different kinds of loans. But such statements do not prove of much use for scientific purposes. They are usually in a very general form, purporting to give the highest and the lowest rates; and they give us no clue to the amounts loaned at each of the different rates. Hence it is not possible to ascertain the averages. What we require for solving most economic problems which involve interest is not the asking rate but the average rate actually paid. This varies from the rates as usually quoted because the circumstances of many of the individual borrowers differ, for better or for worse, from those of the persons to whom money is offered at the quoted rates.

To illustrate the difficulties: I found, in the daily papers, that on a certain date the quotations for commercial loans in San Francisco were 7 to 8 per cent; but on inquiry I ascertained that such loans had been negotiated on the same day at rates ranging from $4\frac{1}{2}$ to $7\frac{3}{4}$ per cent, and the average for the day's business in five large banks was about $5\frac{3}{4}$ per cent. On the same day call loans secured by a deposit of bonds were quoted at 6 to 8 per cent, and the average rate was found to be 4.83 per cent, a very surprising discrepancy. Again

during a given six months the quoted rate on mortgages was invariably 6 to 8 per cent, the lender to pay the taxes; but during the same period mortgages on which the banks paid the taxes were made at rates ranging from 5¼ to 9½ per cent, and the average was 7.35 per cent.

Certain difficulties arise even in what seems to be a very simple case. I suppose that almost any business man thinks he knows the rate of dividends paid by the savings banks. But if the matter be investigated it will be found that the rate varies, a little a least, from bank to bank, and that some of the banks have different classes of deposits upon which different rates are paid. The true average, therefore, will differ from the rate announced by any one bank.

There are many important problems in economics which require for their solution a knowledge of the average rates of interest prevailing at different times and places. Yet the necessary information is very hard to obtain. The tables in Professor Irving Fisher's "Appreciation and Interest" (*Publications of the American Economic Association*, Vol. xi, No. 4.) have proven so useful as to encourage the effort to obtain further details. In the course of an investigation into the effect of the taxation of mortgages on the rate of interest in California, I had an opportunity to obtain the rate of dividends paid by savings banks. The rates of interest on mortgages and on commercial loans in California will be found in the *Yale Review* for May, 1899. The tables there published with the one below contain practicably all the information obtainable concerning rates of interest in California.

The tables are for the most part self-explanatory. Yet a few facts concerning the history of California will, perhaps, help to explain the difference between these rates and those that have prevailed elsewhere. Railroad connection with the East was completed in 1869. Prior to that time California was isolated; was a "new country," and all the economic conditions were peculiar. Capital was comparatively scarce and opportunities for its investment were innumerable. Hence the rates of interest were abnormally high. The current rates in the "early days" were quoted at 1½ to 2 per cent a month. As will be seen from the table the savings banks could pay 1¼ per cent a month dividends even ten years after the arrival of the "Argonauts." The thrifty Michael Reese is said to

have half repented of a generous gift to the University of California with the exclamation: "Ah, but I lose the interest," a very natural regret when interest was 24 per cent per annum.

AVERAGE RATES PER ANNUM OF THE SEMI-ANNUAL DIVIDENDS PAID BY SAN FRANCISCO SAVINGS BANKS.

For the Six Months Prior to First Day of:	Dividend.	For the Six Months Prior to First Day of:	Dividend.
January, 1860	15.00 per cent. *	July, 1880	5.78 per cent.
July, "	15.00 " " *	January, 1881	5.20 " "
January, 1861	12.00 " " *	July, "	4.95 " "
July, "	12.00 " " *	January, 1882	4.78 " "
January, 1862	12.00 " " *	July, "	4.14 " "
July, "	12.00 " " *	January, 1883	4.12 " "
January, 1863	10.75 " "	July, "	4.09 " "
July, "	10.95 " "	January, 1884	4.06 " "
January, 1864	10.87 " "	July, "	4.07 " "
July, "	10.98 " "	January, 1885	4.08 " "
January, 1865	11.64 " "	July, "	4.24 " "
July, "	12.86 " "	January, 1886	4.21 " "
January, 1866	13.09 " "	July, "	4.18 " "
July, "	11.15 " "	January, 1887	4.15 " "
January, 1867	11.05 " "	July, "	4.05 " "
July, "	11.08 " "	January, 1888	4.05 " "
January, 1868	10.67 " "	July, "	4.24 " "
July, "	10.51 " "	January, 1889	4.58 " "
January, 1869	10.63 " "	July, "	4.60 " "
July, "	10.63 " "	January, 1890	5.01 " "
January, 1870	11.27 " "	July, "	5.01 " "
July, "	11.32 " "	January, 1891	5.05 " "
January, 1871	10.49 " "	July, "	5.06 " "
July, "	10.42 " "	January, 1892	5.06 " "
January, 1872	9.45 " "	July, "	4.90 " "
July, "	9.15 " "	January, 1893	4.81 " "
January, 1873	9.14 " "	July, "	4.75 " "
July, "	9.08 " "	January, 1894	4.76 " "
January, 1874	8.60 " "	July, "	4.49 " "
July, "	8.55 " "	January, 1895	4.47 " "
January, 1875	8.60 " "	July, "	4.41 " "
July, "	8.65 " "	January, 1896	4.10 " "
January, 1876	8.70 " "	July, "	4.09 " "
July, "	8.70 " "	January, 1897	4.00 " "
January, 1877	8.69 " "	July, "	3.99 " "
July, "	8.42 " "	January, 1898	3.98 " "
January, 1878	7.95 " "	July, "	3.79 " "
July, "	7.75 " "	January, 1899	3.78 " "
January, 1879	7.02 " "	General average	7.45 " "
July, "	6.80 " "	Average since 1880	4.45 " "
January, 1880	6.55 " "	Average prior to 1880	10.25 " "

* Prior to January, 1863, the dividend quoted is for one bank only.

The period from 1870 to 1880 was one of readjustment. The traditions of the "forty-niners" died away. But the readjustment did not take place without violent convulsions, both economic and political. Beginning in 1872 there was an era of speculative excitement connected with mining which has been likened to the Mississippi Scheme and the South Sea Bubble. This, known as the "Bonanza Mining Boom," seems to have involved the whole community not excepting the banks. The "boom burst" in 1875. From that time until 1880 the general trend of prices, wages, and interest was downward. This led to general unrest and political disturbance which culminated in the new constitution adopted in 1879.

Since 1880 the economic history of California, or at least of the city of San Francisco and vicinity, has not differed so very much from that of the rest of the country. In view of the facts just narrated it has been deemed advisable to divide the tables into two parts at the year 1880. General averages are given for the entire time covered, also for the years since and for those prior to 1880.

CARL C. PLEHN.

MARRIAGES OF THE DEAF.

Marriages of the Deaf in America. By Edward Allen Fay, Vice-President and Professor of Languages in Gallaudet College, Editor of the *American Annals of the Deaf.* Published by the Volta Bureau. Washington, D. C., 1898; pp. 527.

Dr. Fay has brought together in this work the results of the valuable statistics which he was authorized to collect for the United States Census of 1890 relative to the deaf in the United States. The work is largely statistical and has been very carefully prepared. The term "deaf" as used in this inquiry refers to the "totally deaf," "very deaf," or those who have attended schools for the deaf. The marriages considered extend over nearly the whole of the nineteenth century, and are 4471 in number. The tabulation of these comprises 360 pages, and contains the known and essential data relative to each marriage. From these the author has compiled 92 short tables, in order to answer as fully as possible the following questions: —

1. Are marriages of deaf persons more liable to result in deaf offspring than ordinary marriages?

2. Are marriages in which both partners are deaf more liable to result in deaf offspring than marriages in which one of the partners is deaf and the other is a hearing person?

3. Are certain classes of the deaf, however they may marry, more liable than others to have deaf children? If so, how are these classes respectively compared, and what are the conditions that increase or decrease this liability?

4. Aside from the question of the liability of the offspring to deafness, are marriages in which both partners are deaf more likely to result happily than marriages in which one partner is deaf and the other is a hearing person?

From the final summary and conclusions it appears that marriages of the deaf are more common in the United States than in Europe. The pupils of American schools for the deaf, who are recorded as married, constitute 23 per cent of the whole number of such pupils up to 1890, while in the countries of Europe, except Denmark, it varies from 12 to 7 per cent, a fact which the author attributes partly to the absence of marriage restrictions in America and to more prosperous circumstances.

Marriages of the deaf have rapidly increased in America in the present century; this being due largely to the establishment of schools for the deaf.

Deaf and Hearing Partners. A majority of the married deaf have married deaf rather than hearing partners; the proportion of such marriages in which both partners were deaf was 72.5 per cent.

Productiveness. Marriages of deaf persons, one or both of the partners being deaf, are probably somewhat but not much less productive than ordinary marriages. The average number of children of deaf persons to each mother who had children was 2.6.

Deaf Offspring; One or More Partners Deaf. Marriages of deaf persons, one or both partners being deaf, are far more liable to result in deaf offspring than ordinary marriages. The proportion of marriages of the deaf resulting in deaf offspring was 9.7 per cent, and the proportion of deaf children born therefrom was 8.6 per cent. The proportion of ordinary marriages resulting in deaf offspring is unknown (estimated by the author as less than $\frac{1}{10}$ of 1 per cent). On the other

hand, marriages of the deaf are far more likely to result in hearing offspring than in deaf offspring, the proportion of hearing children reported being at least 75 per cent. These results are in accordance, on the one hand, with the law of heredity that a physical anomaly or an unusual liability to certain diseases existing in the parent tends to be transmitted to the offspring; and, on the other hand, with the law of heredity that the offspring tend to revert to the normal type.

Both Partners Deaf or One Partner Hearing. It is not necessary for hereditary transmission that both partners should be deaf. On the contrary, taking the deaf as a whole, marriages in which both partners are deaf are not more liable to result in deaf offspring than those in which one partner is deaf and the other is a hearing person.

Partners Congenitally or Adventitiously Deaf. Congenitally deaf persons whether married to one another or to the adventitiously deaf are more liable to have deaf offspring than are the adventitiously deaf. This liability is greatest when both partners are congenitally deaf. Marriages of adventitiously deaf persons are more liable to result in deaf offspring than ordinary marriages. The greater liability to deaf offspring of marriages of the congenitally deaf than of the adventitiously deaf is in accordance with the generally accepted law of heredity that congenital or innate characteristics are far more likely to be transmitted to the offspring than acquired characteristics.

Partners Having Deaf Relatives. Deaf persons having deaf relatives, however they are married, and hearing persons having deaf relatives and married to deaf partners, are very liable to have deaf offspring. In marriages where both partners are congenitally deaf, and both have deaf relatives, the proportion of them having deaf offspring, and the proportion of deaf offspring born therefrom, are very high (28.4 and 30.3 per cent), but where neither of the partners has deaf relatives, even though both of them are congenitally deaf, the liability appears to be slight.

Partners Consanguineous. The marriages of the deaf most liable to result in deaf offspring are those in which the partners are related by consanguinity. Thirty-one such marriages were recorded, of which 14 or 45.1 per cent resulted in deaf offspring, and 100 children were born of these 31 marriages of which 30 per cent were deaf.

Happiness. Marriages in which both of the partners are deaf are more likely, other things being equal, to result happily than those in

which one of the partners is deaf and the other is a hearing person. The favorable conditions in such cases are the strong bond of mutual fellowship growing out of their similar condition, the ease and freedom of their communication with each other, and the identity of their social relations outside the domestic circle.

These highly valuable researches are due to the liberality of Dr. A. Graham Bell as the originator of the work, and the task has been completed in this very thorough and useful compilation by Dr. Fay.

S. W. A.